



D-MESONS IN MOCK DATA PROMPT, NON-PROMPT SEPARATION

SEBASTIAN TAPIA, MAR 08, 2021, ISU

Displaced vertex observable in MDC1

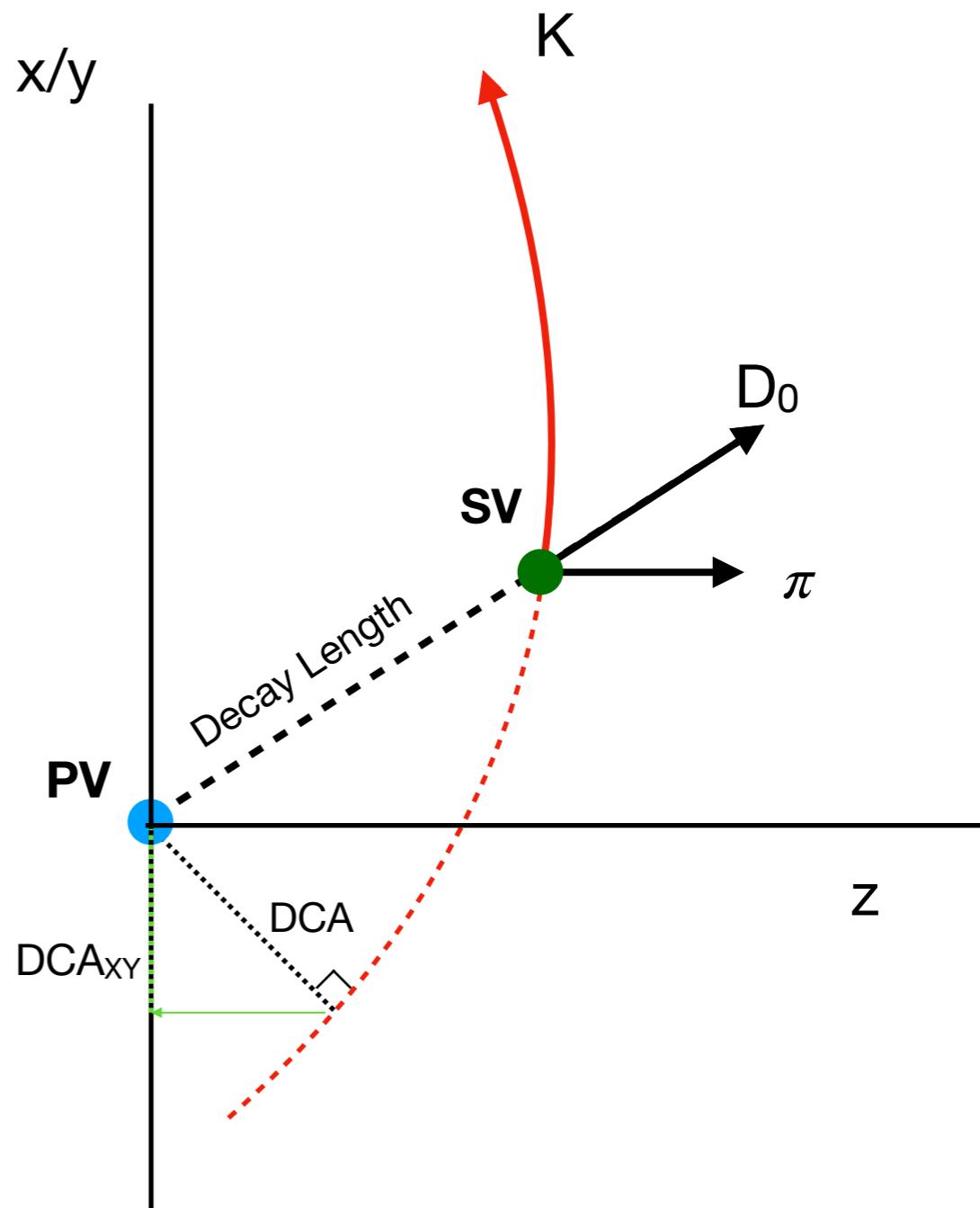
2

MC sample:

- 1) $pp \rightarrow c\bar{c}$
- 2) $pp \rightarrow b\bar{b}$

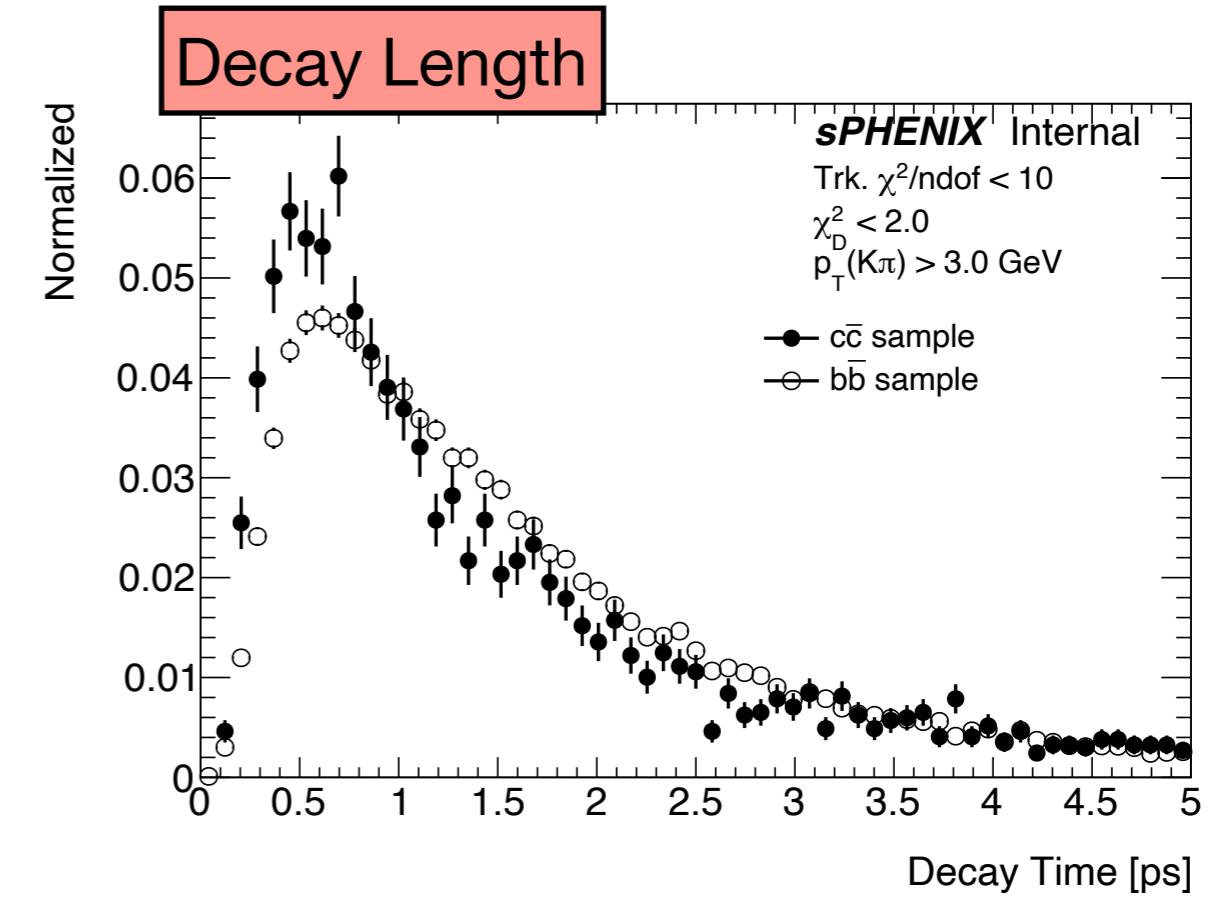
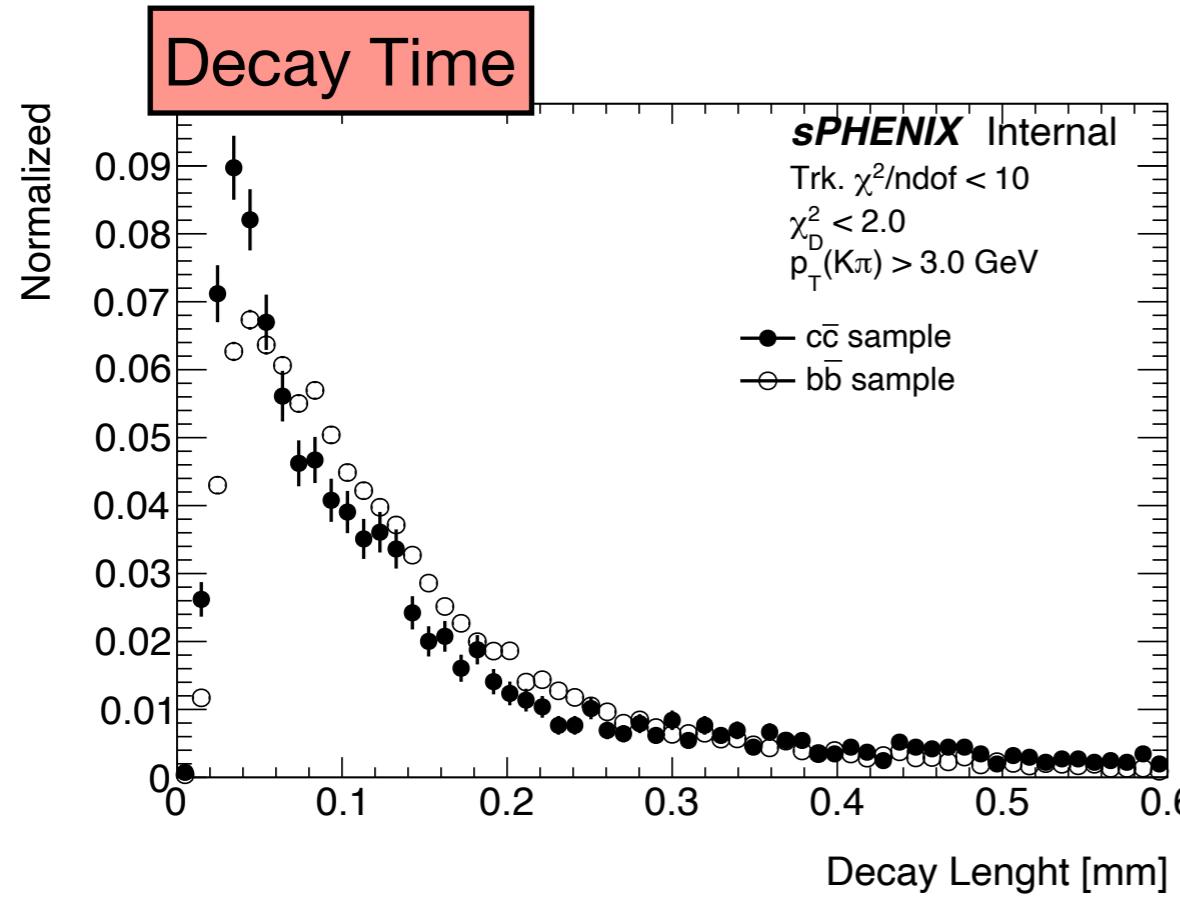
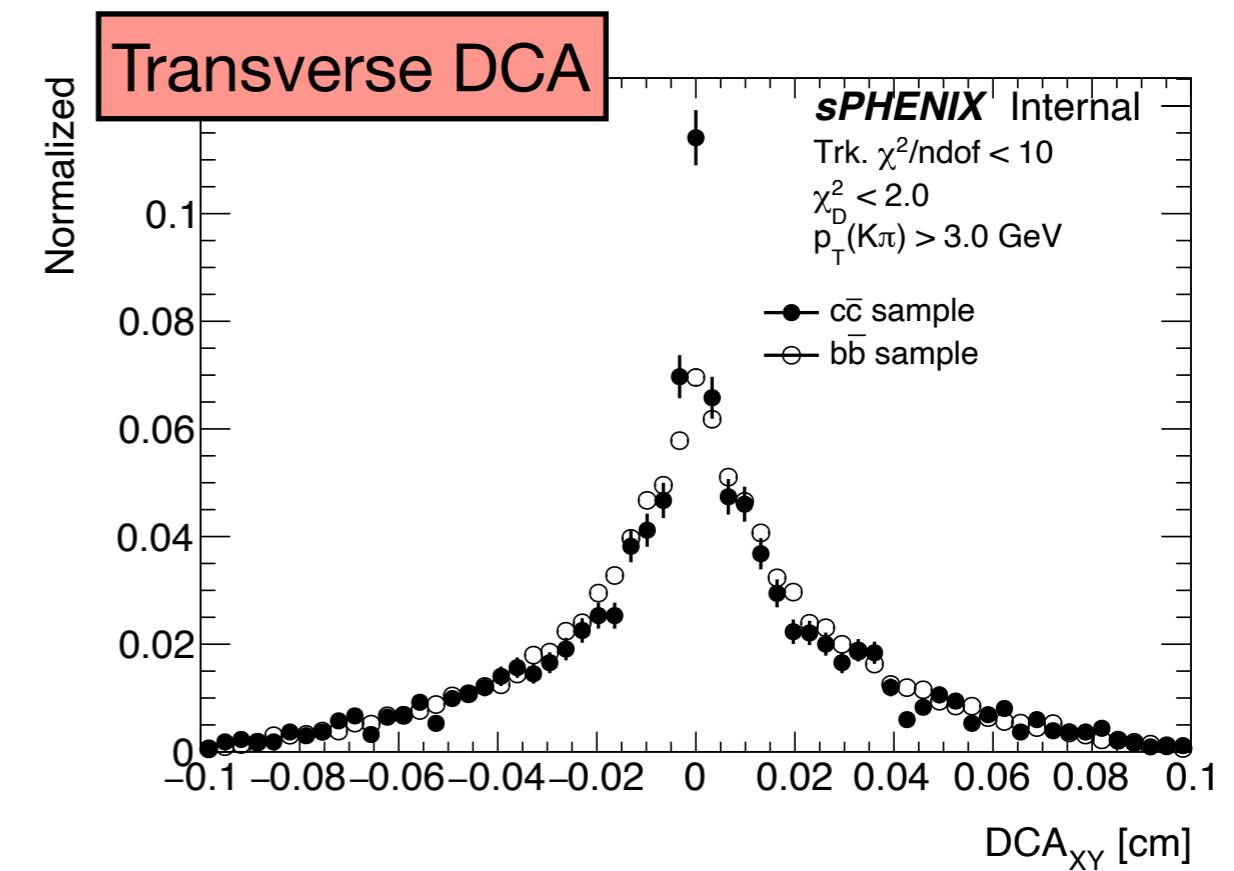
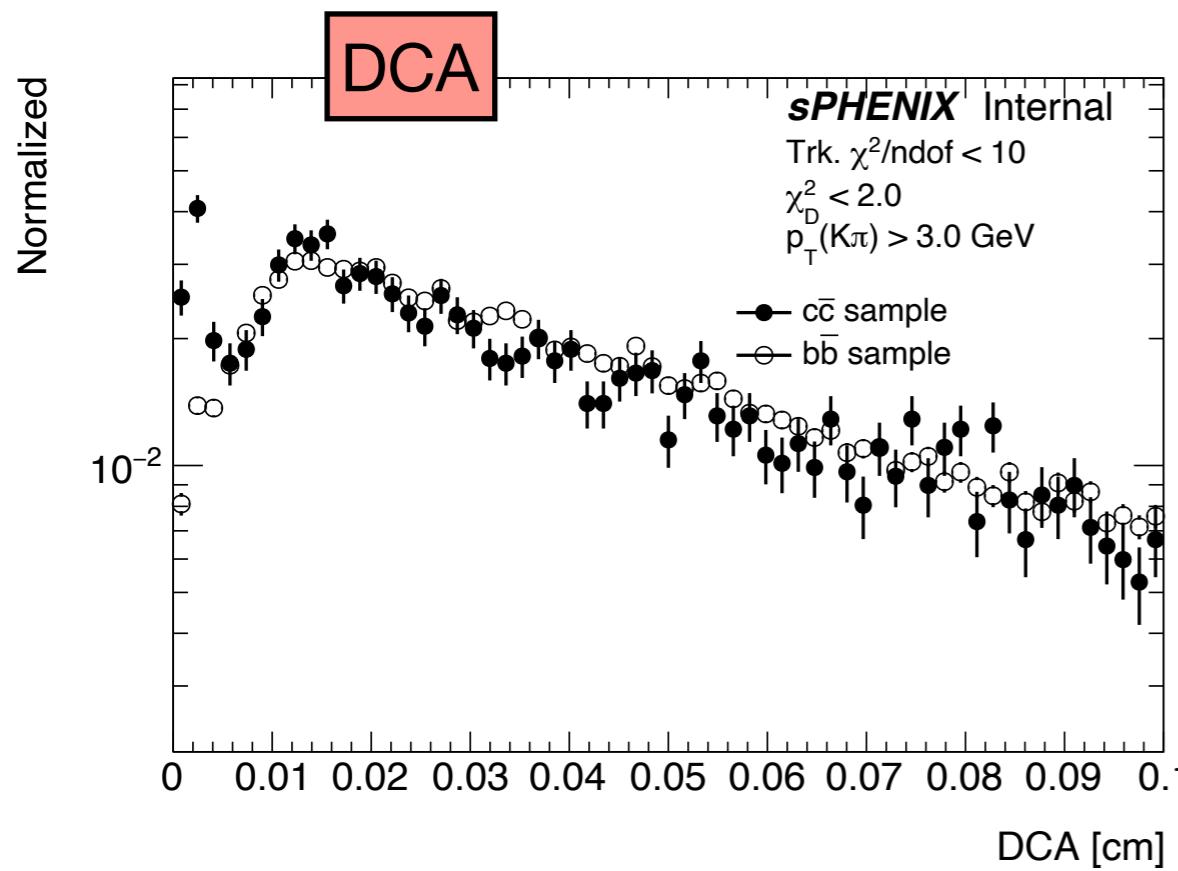
Signature:

$$D^0 \rightarrow K\pi$$



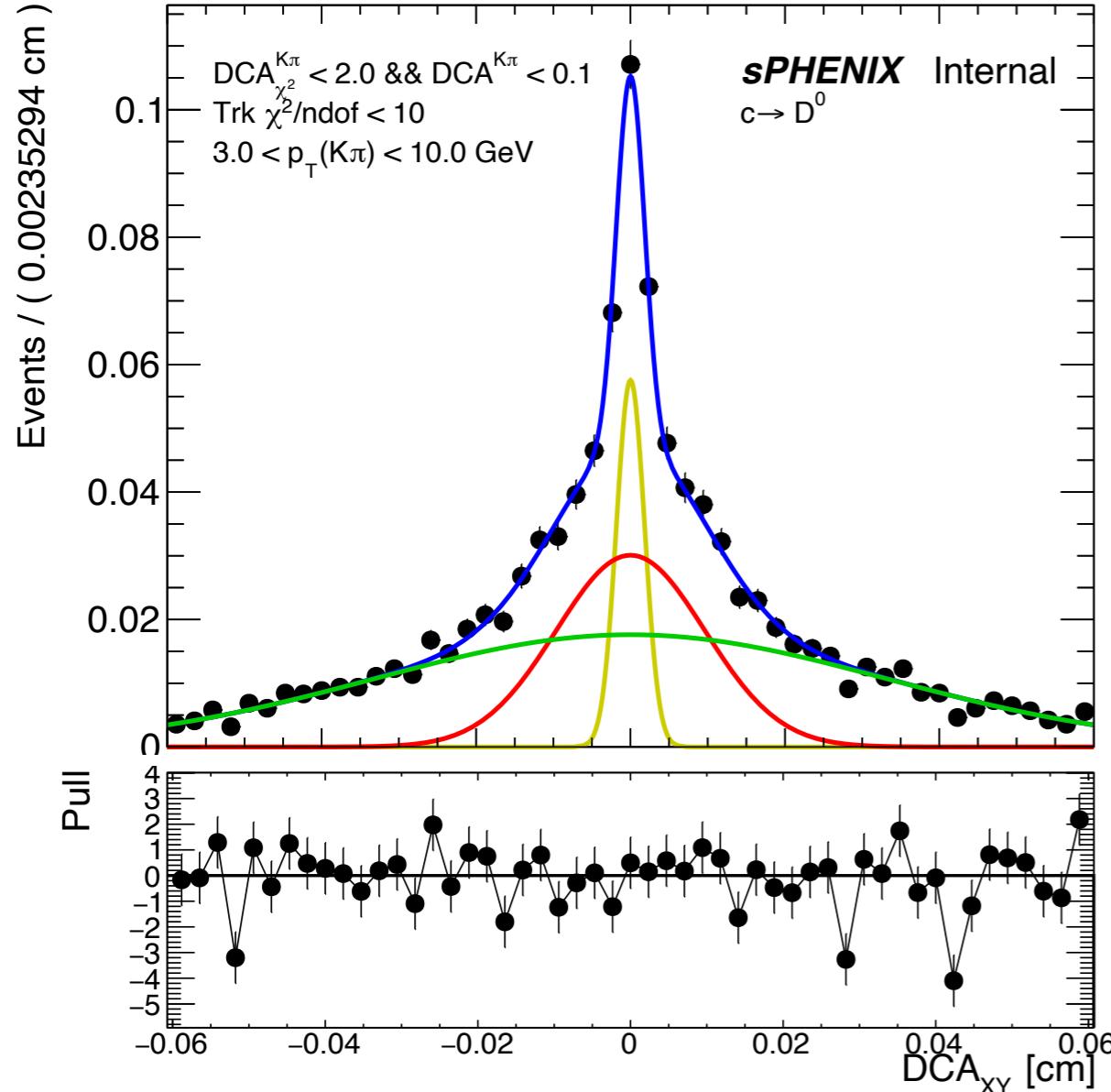
Displaced vertex observable

$D^0 \rightarrow K\pi$

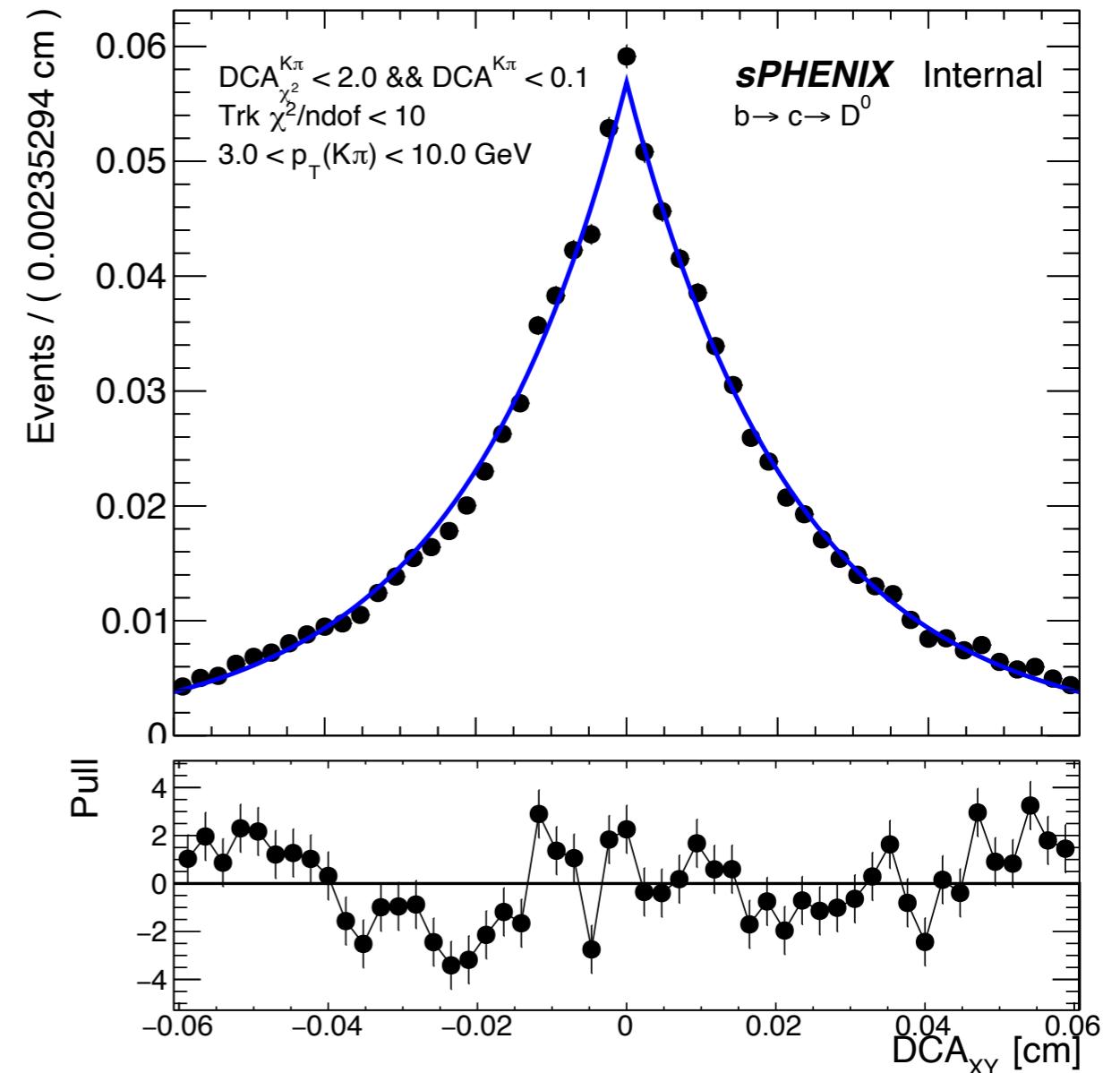


Transverse DCA

$$c \rightarrow D^0 \rightarrow K\pi$$



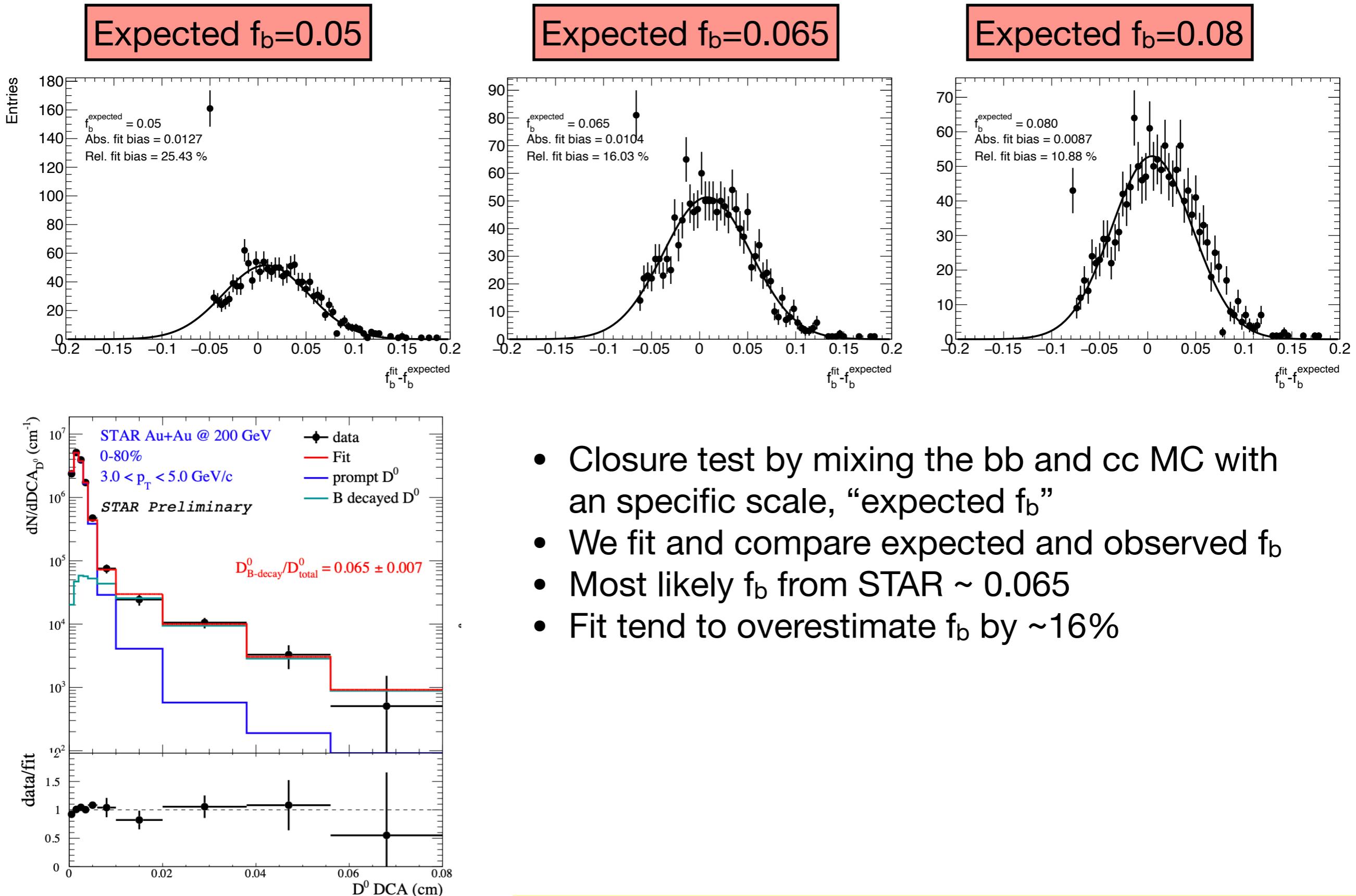
$$b \rightarrow c \rightarrow D^0 \rightarrow K\pi$$



- $c \rightarrow D^0$ DCA_{xy} modeled with 3 gaussian
- $b \rightarrow c \rightarrow D^0$ DCA_{xy} modeled with a double exponential

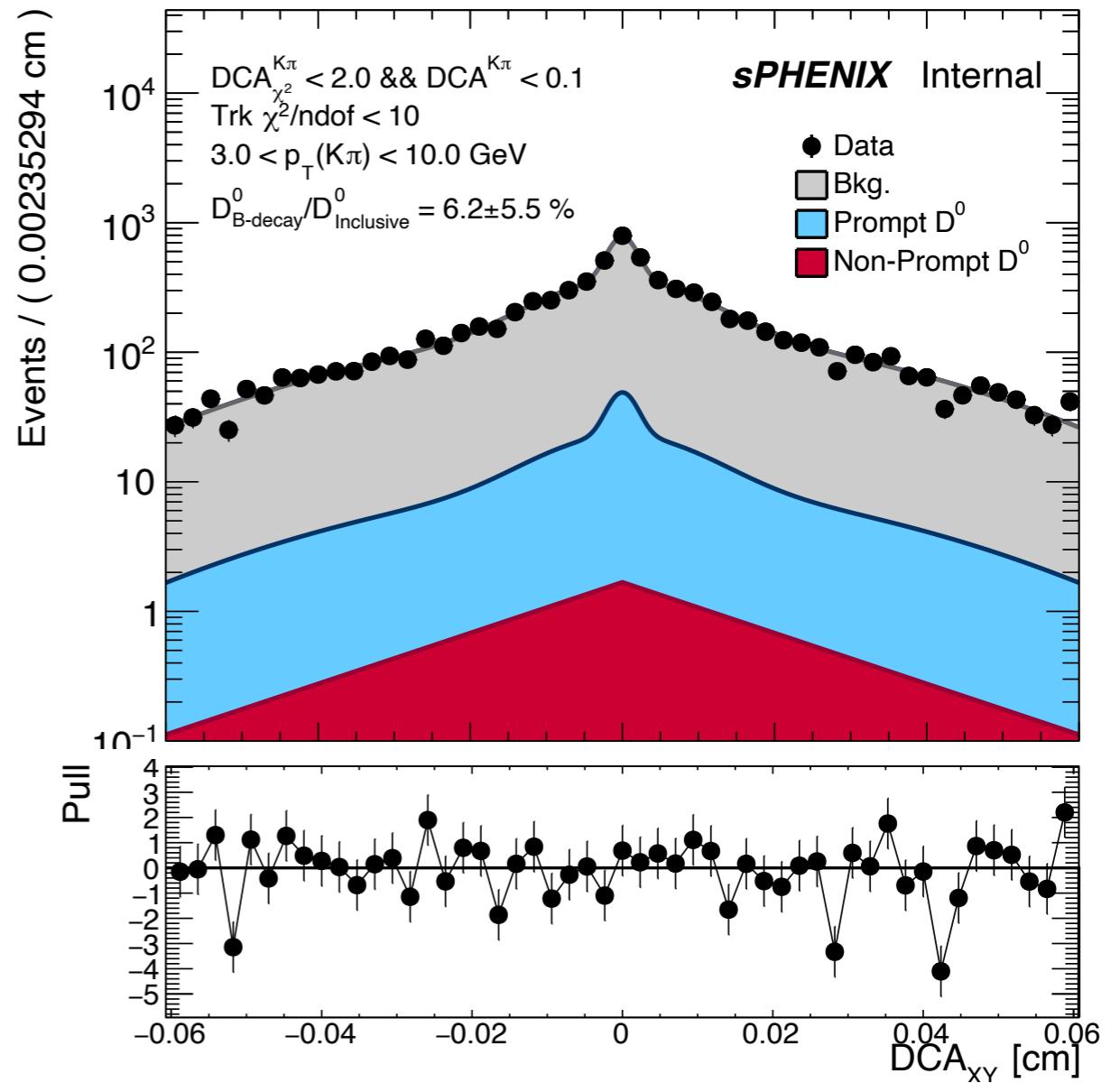
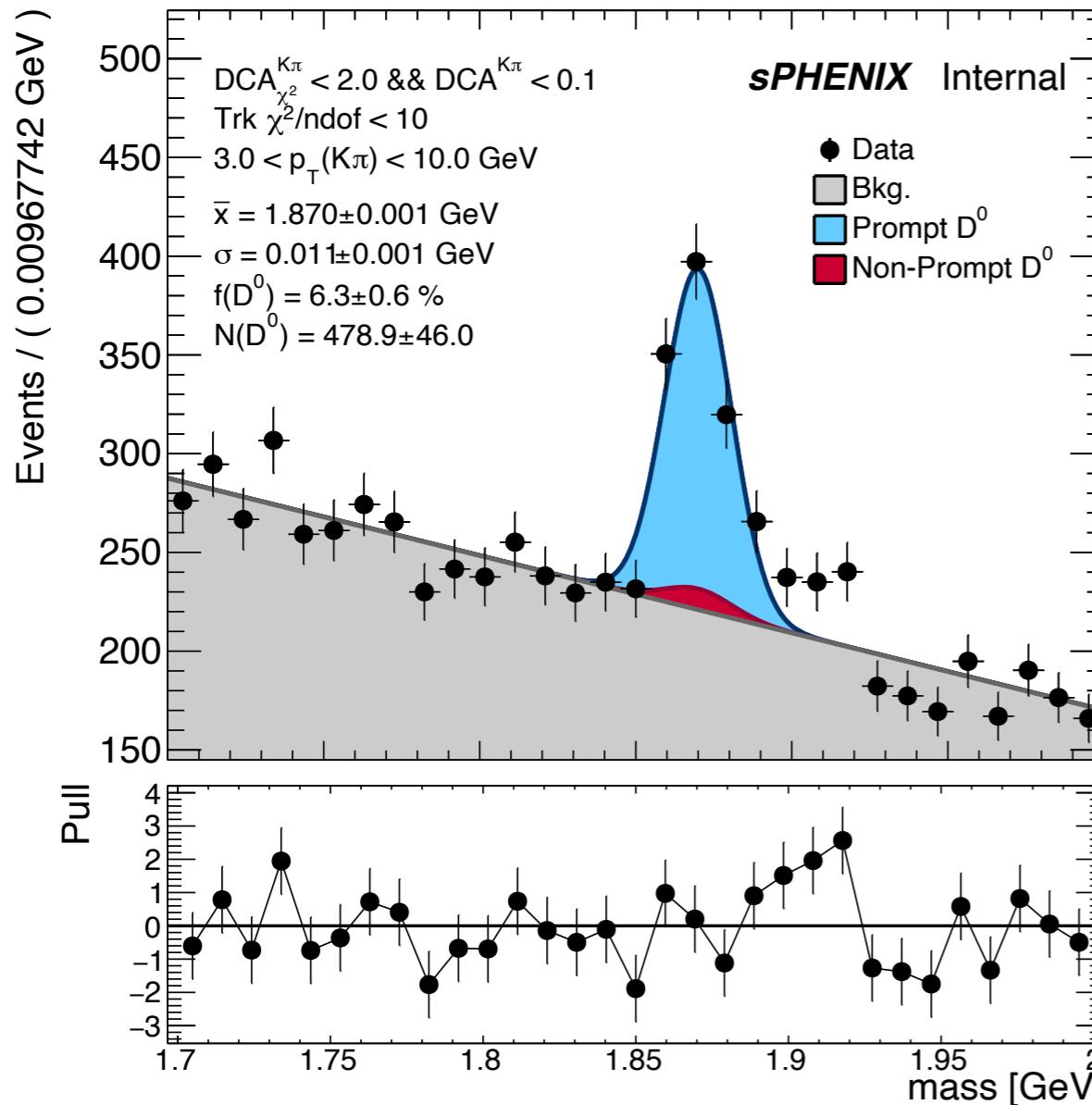
Caveat: assuming same distributions for signal and background

b-fraction closure test



Caveat: We are mixing only signal MC, e.i $pp \rightarrow bb(cc)$

Sequential fit in mass and DCA_{xy}



- Signal and bkg. from Mass fit
 - **Signal** = Gaussian; **Bkg.** = Cheb-polynomial
- B-fraction from DCA_{xy} fit
 - **Prompt** = 3-Gaussians; **Non-prompt** = Double-sided exponential

Caveat: We are mixing only signal MC, e.i $\text{pp} \rightarrow \text{bb(cc)}$

Summary and next step

- Prompt/non-prompt separation looks promising but more study is needed
 - Include mother info in order to separate signal and background DCA distribution
 - Test background rejection in minbias sample

Additional slides